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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/764,295

01/23/2004

Thomas Volkel

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SIEMENS CORPORATION  
INTELLECTUAL PROPERTY DEPT.  
170 WOOD AVENUE SOUTH  
ISELIN, NJ 08830

EXAMINER

WEST, JEFFREY R

ART UNIT

PAPER NUMBER

2857

DATE MAILED: 02/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/764,295

Applicant(s)

VOLKEL, THOMAS

Examiner

Jeffrey R. West

Art Unit

2857

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 05 December 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 December 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Drawings***

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: "74" (Figure 7).
2. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

3. The disclosure is objected to because of the following informalities:

On page 10, line 9, it is indicated that actual spectral vibration data is acquired at step 72, while Figure 7 indicates that the actual spectral vibration data is acquired at step 74 and an alarm curve is established at step 72

Appropriate correction is required.

### ***Claim Objections***

4. Claims 2-6 and 7-10 are objected to because of the following informalities:

In claims 2, 3, and 7-10, line 1, "Claim" should be ---claim---.

It is also noted that the previous amendment to claims 4-6 changing "claims" to --  
-claim--- is still in marked-up form.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 2, 4-8, 10, 11, 13, 15, 16, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over International Application Publication No. 99/60351 to Lofall in view of U.S. Patent No. 5,922,963 to Piety et al.

Lofall discloses a method for spectral evaluation of a rotating object comprising providing a first operating parameter that is an actual rotational speed value (page

29, lines 4-6 and page 30, lines 18-19), automatically (page 19, lines 17-19) recording a frequency spectrum of the object to be tested by measuring means, wherein the frequency spectrum has first amplitude values which depend on first frequency values (page 26, lines 3-17), automatically using the first frequency values of the frequency spectrum for normalization in relation to the actual rotational speed value (page 30, lines 9-23), automatically forming an alarm curve with second amplitude values which depend on second frequency values (page 30, lines 24-31), automatically using the second frequency values of the alarm curve for normalization in relation to the actual rotational speed value (page 30, line 32 to page 31, line 8), automatically comparing the first amplitude values of the normalized frequency spectrum with the second amplitude values of the normalized alarm curve (page 31, lines 8-10), and using a result of the comparison to evaluate the object to be tested (page 31, lines 10-12).

Lofall discloses that the measuring means are fashioned as vibro-acoustic measuring means (page 6, lines 21-24)

Lofall discloses that the method is used for a spectral evaluation of a machine (page 7, lines 15-18) or monitoring the vibration of vehicle components (page 34, line 1).

As noted above, Lofall teaches many of the features of the claimed invention and while the invention of Lofall does teach the option of including additional operating parameters of current load and temperature values in the vibration analysis (page 30, lines 5-8, page 32, line 27 to page 33, line 19, and page 38, lines 26-29), Lofall

does not explicitly teach changing the second amplitude values of the reference spectrum according to the operating parameters to form an envelope alarm curve.

Piety teaches a method for determining narrowband envelope alarm limits based on machine vibration spectra comprising obtaining sensed vibration amplitude data from a rotating machine (column 1, lines 6-8) in time domain (column 2, lines 27-36), transforming the time domain data into frequency domain data (column 2, lines 36-40) and comparing the frequency domain data to an alarm limit/curve (column 2, lines 40-46). Piety further teaches gathering vibration amplitude data versus frequency from the rotating machine at a second load value different than a first/current load value and adjusting the alarm limit/curve to account for the difference between the first and second load values, functionally as specified by a user, (column 13, lines 5-33), wherein the alarm curve which is adjusted according to the operating parameters form an envelope curve over the frequency spectrum of the object to be tested in a fault free normal condition, wherein an alarm is generated if at least one amplitude value of the frequency spectrum lies outside the envelope curve (column 4, lines 36-38, column 6, lines 36-34 and Figure 4).

It would have been obvious to one having ordinary skill in the art to modify the invention of Lofall to explicitly teach changing the second amplitude values of the reference spectrum according to the operating parameters to form an envelope alarm curve, as taught by Piety, because, as suggested by Piety the combination would have provided an easy and effective method for developing accurate narrowband alarm limits/curves (column 2, lines 15-23) that takes into account the

affect of load differences on the vibration spectrum by adjusting the alarm limit/curve to be specific for each operating load, thereby improving the accuracy of the fault detection by insuring that a false alarm is not detected due to differences in the vibration data caused by load differences (column 13, lines 5-33) as well as allowed a user to clearly view the alarm results to aid in determining the type and severity of a fault (column 1, lines 25-34).

7. Claims 3, 9, 12, 14, 17, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lofall in view of Piety and further in view of European Patent Application Publication No. 0 908 805 to Hoth et al.

As noted above, the invention of Lofall and Piety teaches many of the features of the claimed invention and while the invention of Lofall and Piety does teach gathering vibration amplitude data versus frequency from the rotating machine at second load, speed, and/or resolution values different than first/current load, speed, and/or resolution values and adjusting the alarm limit/curve to account for the difference between the first and second load, speed, and/or resolution values (column 13, lines 5-33), the combination does not explicitly indicate that the alarm curve should also be adjusted for temperature.

Hoth teaches a method and apparatus for performing pre-emptive maintenance on operating equipment for the analysis of a rotary machine (column 5, lines 6-10) comprising monitoring vibration data for failure analysis (column 8, lines 12-20) and comparing the vibration data to reference/norm data (column 3, lines 30-36). Hoth

further teaches that the amplitude values of the reference/norm data are calculated for specific instances of load and temperature parameters (column 5, lines 17-24 and column 9, lines 27-35).

It would have been obvious to one having ordinary skill in the art to modify the invention of Lofall and Piety to explicitly indicate that the alarm curve should also be adjusted for temperature, as taught by Hoth, because the invention of Lofall and Piety does adjust the alarm curves for load, speed, and resolution and Hoth suggests that temperature is another important parameter that contributes to the accuracy of vibration analysis (column 5, lines 17-24 and column 9, lines 27-35) and therefore, the combination would have improved the analysis method of Lofall and Piety by taking into account a greater amount of operating parameters that contribute to the analysis to insure that a false alarm is not detected due to differences in the vibration data caused by temperature differences.

### ***Response to Arguments***

8. Applicant's arguments with respect to claims 1-19 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

9. The prior art made of record and not relied upon is considered pertinent to Applicant's disclosure.



U.S. Patent No. 5,287,837 to Hashimoto et al. teaches a knock suppressing apparatus for internal combustion engines.

U.S. Patent No. 4,528,852 to Sohoel teaches a method and instrument for determining the condition of an operating bearing comprising eliminating the influence of rotational speed on the data measurements.

U.S. Patent No. 6,233,212 to Kaaden teaches monitoring and adjusting a motor current in a disk data drive to optimize a disk rotation speed including means for normalizing stored nominal values of motor current for determined rotational speeds.

U.S. Patent No. 4,958,125 to Jardine et al. teaches a method and apparatus for determining characteristics of the movement of a rotating drill string including rotation speed and lateral shocks including means for normalizing the measurement spectrum to a constant rotation speed of the drill bit.

U.S. Patent No. 6,321,602 to Ben-Romdhane teaches condition based monitoring by vibrational analysis wherein the vibrational spectrum is normalized with respect to a shaft RPM to result in a comparison of frequencies relative to the shaft RPM.

U.S. Patent No. 4,194,129 to Dumbeck teaches armature slip analysis of induction motors with temperature and voltage correction.

U.S. Patent No. 6,062,071 to Henn et al. teaches a method for detecting combustion misfires in an internal combustion engine comprising comparison to a threshold that is adjusted based on load and temperature.

International Application Publication No. 96/13011 to Haseley et al. teaches a vibration monitoring system comprising means for determining vibration data in the form of rotational speed (page 5, lines 27-35) of a machine or vehicle (page 5, lines 9-16), transforming the vibration data to spectral data using a FFT (page 6, lines 13-21) and generating an alarm (page 7, lines 27-30) when at least one amplitude value of the frequency spectrum lies outside an envelope curve formed over the vibration spectral data (page 9, lines 26-35). Haseley further teaches changing the amplitude values of the reference spectrum (i.e. footprint) (page 11, lines 19-22) as a user-specified function of load operating parameters (page 9, lines 15-25).

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey R. West whose telephone number is (571)272-2226. The examiner can normally be reached on Monday through Friday, 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marc S. Hoff can be reached on (571)272-2216. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

jrw  
February 21, 2006

  
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